CLAIMS

What is claimed is:

1. An optical device comprising:

an optical source for producing an optical beam having spaced apart first and second focal points of origin in orthogonal first and second planes of beam propagation of the optical beam, respectively;

a first lens disposed in an optical path of the optical beam and having a first optical focusing power in both the first and second planes of beam propagation, wherein the first lens is disposed at a first distance from the first focal point of origin for generally collimating the optical beam in the first plane of beam propagation and for focusing the optical beam down to a first beam diameter in the second plane of beam propagation at an image position located a second distance from the first lens; and

a second lens disposed in the optical path of the optical beam and having a second optical focusing power in the first plane of beam propagation and generally no optical focusing power in the second plane of beam propagation, wherein the second lens is disposed at a third distance from the image position for focusing the optical beam down to a second beam diameter in the first plane of beam propagation at the image position.

2. The optical device of claim 1, wherein the first and second beam diameters are substantially equal to each other.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

3. The optical device of claim 2, wherein at the image position, the optical beam has a numerical aperture in the first plane of beam propagation that is substantially equal to that of the beam in the second plane of beam propagation.

4. The optical device of claim 1, wherein the first lens has a focal length, and wherein the first distance is substantially equal to the first lens focal length.

5. The optical device of claim 4, wherein the second lens has a focal length, and wherein the third distance is substantially equal to the second lens focal length.

6. The optical device of claim 1, further comprising:

an optical fiber having an input end disposed at the image position for receiving the optical beam.

7. The optical device of claim 6, wherein:

the optical beam incident upon the first lens has a second numerical aperture in the second plane of beam propagation;

the optical fiber has an acceptance numerical aperture associated therewith;

the first and second focal points of origin are separated by a fourth distance; and

the second numerical aperture divided by the acceptance numerical aperture is substantially equal to or less than the second distance divided by the sum of the first focal length and the fourth distance.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

8. The optical device of claim 7, wherein:

the second numerical aperture divided by the acceptance numerical aperture is substantially equal to the second distance divided by the sum of the first focal length and the fourth distance.

9. The optical device of claim 6, wherein:

the optical beam incident upon the first lens has a first numerical aperture in the first plane of beam propagation;

the optical fiber has an acceptance numerical aperture associated therewith; and

the first numerical aperture divided by the acceptance numerical aperture is substantially equal to or less than the second focal length divided by the first focal length.

10. The optical device of claim 9, wherein:

the first numerical aperture divided by the acceptance numerical aperture is substantially equal to the second focal length divided by the first focal length.

11. The optical device of claim 1, wherein the second lens is a cylindrical lens.

12. The optical device of claim 1, wherein the optical source is a master oscillator power amplifier having a diode laser portion for generating the optical beam and a planar waveguide amplifier portion for amplifying the optical beam, and wherein

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

the second focal point of origin is located approximately at a location where the optical beam exits the diode laser portion, and the first focal point of origin is located approximately at a location where the optical beam exits the planar waveguide amplifier portion.

13. An optical system for focusing an optical beam into an input face of an optical fiber, wherein the optical beam has spaced apart first and second focal points of origin in orthogonal first and second planes of beam propagation of the optical beam, respectively, the optical system comprising:

a first lens disposed in an optical path of the optical beam and having a first optical focusing power in both the first and second planes of beam propagation, wherein the first lens is disposed at a first distance from the first focal point of origin for generally collimating the optical beam in the first plane of beam propagation and for focusing the optical beam down to a first beam diameter in the second plane of beam propagation at an image position located a second distance from the first lens; and

a second lens disposed in an optical path of the optical beam and having a second optical focusing power in the first plane of beam propagation and generally no focusing power in the second plane of beam propagation, wherein the second lens is disposed at a third distance from the image position for focusing the optical beam down to a second beam diameter in the first plane of beam propagation at the image position.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

14. The optical system of claim 13, wherein the first and second beam diameters are substantially equal to each other.

15. The optical system of claim 14, wherein at the image position, the optical beam has a numerical aperture in the first plane of beam propagation that is substantially equal to that of the beam in the second plane of beam propagation.

16. The optical system of claim 13, wherein the first lens has a focal length, and wherein the first distance is substantially equal to the first lens focal length.

17. The optical system of claim 16, wherein the second lens has a focal length, and wherein the third distance is substantially equal to the second lens focal length.

18. The optical system of claim 13, wherein:

the optical beam incident upon the first lens has a second numerical aperture in the second plane of beam propagation:

the optical fiber has an acceptance numerical aperture associated therewith;

the first and second focal points of origin are separated by a fourth distance; and

the second numerical aperture divided by the acceptance numerical aperture is substantially equal to or less than the second distance divided by the sum of the first focal length and the fourth distance.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

19. The optical system of claim 18, wherein:

the second numerical aperture divided by the acceptance numerical aperture is substantially equal to the second distance divided by the sum of the first focal length and the fourth distance.

20. The optical system of claim 13, wherein:

the optical beam incident upon the first lens has a first numerical aperture in the first plane of beam propagation;

the optical fiber has an acceptance numerical aperture associated therewith; and

the first numerical aperture divided by the acceptance numerical aperture is substantially equal to or less than the second focal length divided by the first focal length.

21. The optical system of claim 20, wherein:

the first numerical aperture divided by the acceptance numerical aperture is substantially equal to the second focal length divided by the first focal length.

22. The optical system of claim 13, wherein the second lens is a cylindrical lens.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

23. A method of focusing an astigmatic optical beam, comprising:

producing an optical beam having spaced apart first and second focal points of origin in orthogonal first and second planes of beam propagation of the optical beam, respectively;

placing a first lens in the optical beam and having a first optical focusing power in both the first and second planes of beam propagation, wherein the first lens is placed at a first distance from the first focal point of origin for generally collimating the optical beam in the first plane of beam propagation and for focusing the optical beam down to a first beam diameter in the second plane of beam propagation at an image position located a second distance from the first lens; and

placing a second lens in the optical beam and having a second optical focusing power in the first plane of beam propagation and generally no optical focusing power in the second plane of beam propagation, wherein the second lens is placed at a third distance from the image position for focusing the optical beam down to a second beam diameter in the first plane of beam propagation at the image position.

24. The method of claim 23, wherein the first and second focused beam diameters are substantially equal to each other.

25. The method of claim 24, wherein at the image position, the optical beam has a numerical aperture in the first plane of beam propagation that is substantially equal to that of the beam in the second plane of beam propagation.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

26. The method of claim 23, wherein the first lens has a focal length, and wherein the first distance is substantially equal to the first lens focal length.

27. The method of claim 26, wherein the second lens has a focal length, and wherein the third distance is substantially equal to the second lens focal length.

28. The method of claim 23, further comprising:

placing an input end of an optical fiber at the image position for receiving the optical beam.

29. The method of claim 28, wherein:

the optical beam incident upon the first lens has a second numerical aperture in the second plane of beam propagation;

the optical fiber has an acceptance numerical aperture associated therewith;

the first and second focal points of origin are separated by a fourth distance; and

the second numerical aperture divided by the acceptance numerical aperture is substantially equal to or less than the second distance divided by the sum of the first focal length and the fourth distance.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

30. The method of claim 29, wherein the second numerical aperture divided by the acceptance numerical aperture is substantially equal to the second distance divided by the sum of the first focal length and the fourth distance.

31. The method of claim 28, wherein:

the optical beam incident upon the first lens has a first numerical aperture in the first plane of beam propagation;

the optical fiber has an acceptance numerical aperture associated therewith; and

the first numerical aperture divided by the acceptance numerical aperture is substantially equal to or less than the second focal length divided by the first focal length.

32. The method of claim 31, wherein the first numerical aperture divided by the acceptance numerical aperture is substantially equal to the second focal length divided by the first focal length.

33. The method of claim 23, wherein the second lens is a cylindrical lens.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

34. The method of claim 23, wherein producing the optical beam comprises:

generating the optical beam with a diode laser; and

amplifying the generated optical beam with a planar waveguide amplifier;

wherein the second focal point of origin is located approximately at a location where the optical beam exits the diode laser, and the first focal point of origin is located approximately at a location where the optical beam exits the planar waveguide amplifier.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111